DRAFT HISTORICAL INFORMATION AND
PRELIMINARY HEALTH RISK ASSESSMENT REPORT, OU-3
US ENVIRONMENTAL PROTECTION AGENCY
SPECIFIC COMMENTS

Page ES-1, last paragraph While EPA does not disagree that data must meet certain criteria for inclusion in a quantitative risk assessment, the mere statement that " the specificity and quality of existing information are insufficient to perform a rigorous quantitative human health risk assessment" does not indicate that any criteria were considered in coming to this conclusion Refer to EPA guidance on data useability in risk assessment (EPA 1990b) for acceptable criteria The final report must include an evaluation of the available data which is referred to in this draft report using the criteria contained in this guidance document This evaluation will provide the basis for any conclusion on the applicability of the data to risk assessment

Page ES-2, fourth paragraph Provide a reference for the first sentence of this paragraph beginning, "Past environmental investigations "

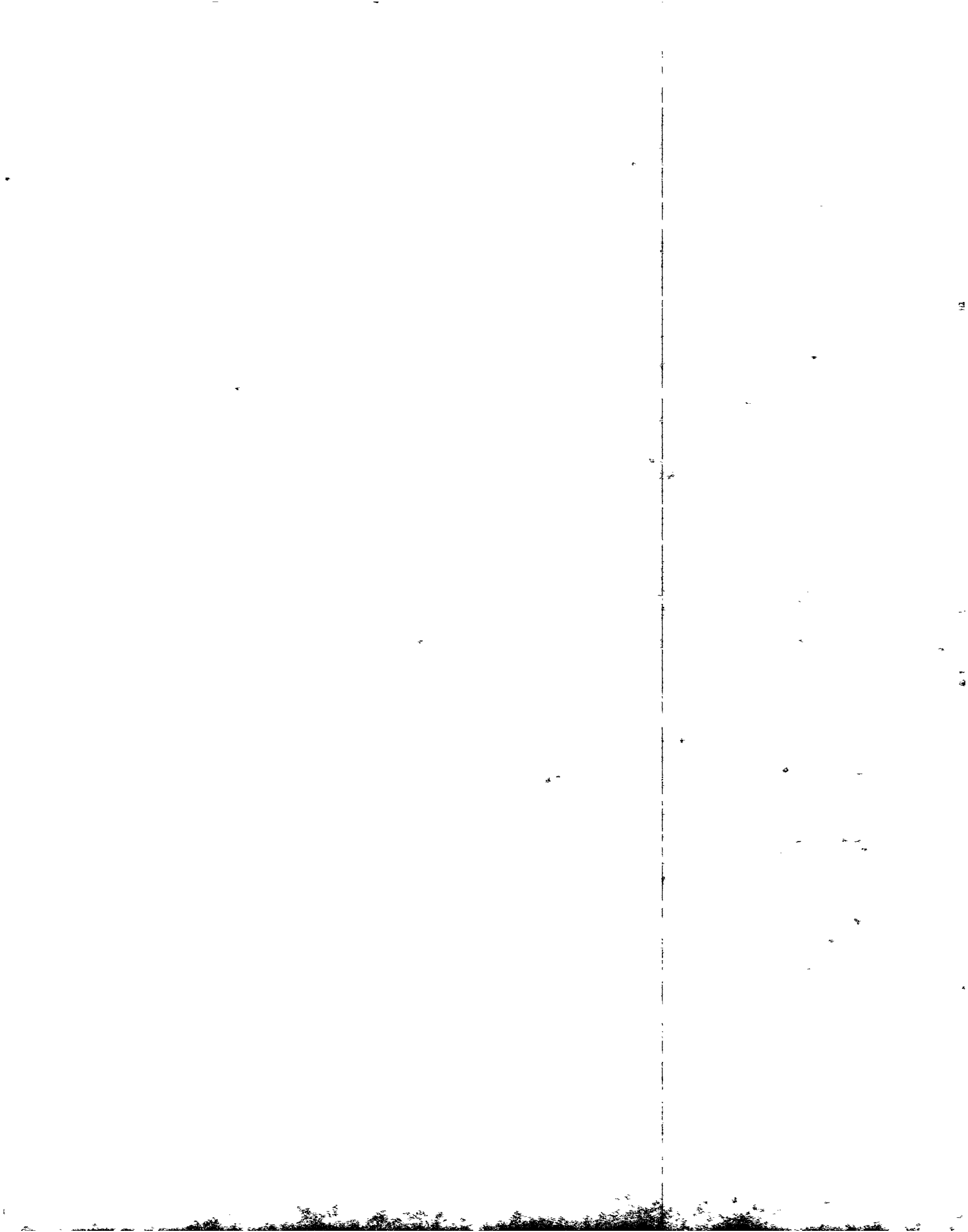
Page ES-3, last paragraph Statements regarding the report's consideration of the highest exposure potential need to be clarified to reflect that consideration was only given to human exposure It is conceivable that after consideration of environmental receptors, other exposure pathways will be shown to be the most critical, e g , ingestion of contaminated sediments by aquatic biota

Page ES-3, last paragraph It is not meaningful to compare Pu levels in reservoir sediments with the Colorado Department of Health (CDH) standard for plutonium in the top surface layer of soil

Page ES-3, last paragraph The plutonium levels detected in the sediments of Great Western Reservoir are significantly higher than those detected in Standley lake This difference should be stated in the conclusions

Page ES-3, last paragraph Given the configuration of the off site drainages, it is expected that plutonium levels in the sediment of Mower Reservoir are similar to those in Standley Lake, not Great Western Reservoir

Page 2, second paragraph The specific objectives for the Historical Information Summary and Preliminary Health Risk Assessment Report should be consistent with the primary objectives as stated in the Interagency Agreement (IAG) The IAG contemplates a quantitative risk assessment in this report An



objective of providing a "preliminary qualitative health risk assessment" appears to be predecisional The decision to provide a qualitative assessment can only be made after an evaluation of the available data

Page 6, Section 2 1 1, Location and Description There are four steps in the baseline risk assessment process data collection and evaluation, exposure assessment, toxicity assessment, and risk characterization (EPA, 1989) The exposure assessment step begins with a characterization of the site exposure setting This characterization discusses among other things, the land use considerations for the site For this reason, it is important to describe in detail what types of access restrictions are in place The first paragraph of this section mentions that public access to Great Western Reservoir and the surrounding area is restricted Elaborate on the nature of these restrictions Are certain activities restricted? Is complete access restricted at certain times? Are certain populations restricted?

Page 8, Section 2 1 2 1, Reservoir and Drainage Sediments Provide a table of historical data and baseline (background) concentrations of radionuclides for comparison purposes Provide a reference and a description of the baseline data (such as collection location) also

Page 9, third paragraph The statement made here and elsewhere that "decay of naturally-occurring radium-226 in surface water and domestic waters near the Rocky Flats Plant (RFP) represents a much greater relative contribution to public radiation exposure than does plutonium released from the RFP " is irrelevant Any radiation exposures resulting from RFP releases will be in addition to any naturally occurring radiation exposures Also the statement indicates that public exposure to plutonium from RFP releases has been well characterized whereas it is repeatedly stated throughout the report that the data is inadequate for risk assessment purposes The statement should be rephrased or eliminated The plutonium released from RFP is not a natural contaminant Any exposures resulting from RFP releases are not directly comparable to naturally occurring radiation exposures

Page 11, first paragraph The depth at which the contaminated sediments exist in the reservoirs of concern is never given in the report and should be added This information would help to support statements made throughout the report that plutonium has not migrated from the reservoir bottom sediments where it was originally deposited

Page 12, first paragraph The unequivocal statement that tap water was below standards is not supported given that other sections of the text allege that the data base as a whole is

inadequate for quantifying exposure. Provide some information about the quality of the database from which this conclusion is drawn in order to put the uncertainty in perspective.
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Page 12, first and fifth paragraphs: The drinking water standards briefly mentioned on this page and elsewhere, including page 17, should be presented in a table to allow direct comparison with historical data, which should also be presented in a table However, the statements in this section are erroneous EPA has never had a plutonium standard for public water supplies in 3,700 dpm/l, and EPA has not to date promulgated a uranium standard for public water supplies.

Page 12, third paragraph. This paragraph seems to indicate that RFP has contaminated all regional water bodies and drinking water supplies with transuranic contaminants If this is true, the paragraph should remain as is and further investigation into the movement of transuranics from RFP is needed However, if this is not what is meant, then the paragraph should be carefully rewritten. The paragraph implies a very broad contamination problem that, if true, contradicts repeated statements in the report concerning the immobility of plutonium in the environment.

Page 13, Section 2 2.1, Location and Description: The Health Advisory Panel, which includes an EPA Region VIII representative, has been shown recent video tapes of Standley Lake at different times of the year at significantly different water levels. The area of exposed lake bottom fluctuates throughout the year. Given this fact, amend the text in this section of the report to reflect actual conditions as appropriate

Page 15, Section 2.2.2.1, Reservoir and Drainage Sediments: The statement that analysis of Standley Lake sediments showed above baseline concentrations, but failed to confirm contamination of the reservoir, appears contradictory. This statement should be clarified. As written, the statement is confusing.

Page 17, Section 2.2.2.2, Reservoir and Drainage Water Quality: To simply state that concentrations were above or below detection limits is meaningless unless the quantitative values for these detection limits are given.

Page 18, second sentence As in other areas of the text, provide a table of relevant standards to allow direct comparison with available data

Page 20, first paragraph: Contrary to the first sentence in this paragraph, EPA does not believe there is any question that Woman Creek and Walnut Creek were pathways of plutonium contamination in Great Western Reservoir and to a lesser extent, Standley Lake

Page 20, second paragraph: The 1990 study conducted by the

Colorado School of Mines which is referenced in this paragraph may be important in defining the background concentrations of radionuclides Please provide EPA with a copy for review Specifically, EPA is interested in the choice of a peak value as a baseline concentration for plutonium in sediments of Front Range lakes

Page 22, Section 3 1, Historic Sources This section implies that the only contaminant that is present above background levels in the reservoirs is plutonium Investigations by DOE conclude that ^{241}Am is present in the waters and sediments of Great Western Reservoir (Battelle, 1974) Also, it must be clarified that the available studies only considered a limited number of contaminants For example, DOE acknowledges that tritium was accidentally released in 1973 however, tritium contamination in sediments has not been studied (Rockwell, 1988b) The fact that plutonium may represent a subset of the radionuclides possible at the site is acknowledged in Table 4 2 but it should be clarified in the text to avoid misleading the reader

Page 22, Section 3 2, Source Area Characterization The assumption is made here, and throughout the report, that the plutonium present in site soils is plutonium dioxide, but no rationale or data to support this assumption are provided Nor are any references cited that discuss site-specific data Data should be provided that verify this assumption or a rationale to justify it should be presented Plutonium dioxide is described in the report as being insoluble, which leads to a long retention time in the lung but little absorption in the gut Insolubility also reduces environmental mobility These are important factors when evaluating potentially important transport and exposure pathways Justification of this assumption is essential to validate the health risk evaluation

Page 22, Section 3 2, Source Area Characterization The statement that sediment load is the main water transport mechanism for plutonium should be justified with a reference and rationale

Page 25, Section 3 3, Release Mechanisms and Exposure Pathways Colloidal transport of plutonium in ground water is briefly mentioned, however, no discussion of the potential for colloidal transport of plutonium by site surface and ground waters is provided Additionally, the recommendations and conclusions do not address this possibility by suggesting further study of surface and ground waters Some further discussion of this phenomenon is required, if only to dismiss it as a reasonable possibility based on site conditions, data, or other rationale Colloidal transport of plutonium and americium far beyond distances previously expected has been shown to occur (Penrose, et al 1990) It is important to explain how colloidal transport is related to the contamination of solid waste

management units (SWMU) 200 through 202, particularly if the statement made previously in the report is true, that is, that prior to RFP operations no transuranics were present in regional waters but are now detected throughout the region (page 12; DOE, 1990a) The evaluation should include analysis of all potential transport pathways

Page 26, Section 4 0 This section should restate that a quantitative risk assessment will be performed in accordance with the EPA guidance (EPA, 1989) as part of the RI. This is important because the assessment conducted is inadequate with respect to EPA guidance It would also assure that this document serves only as a preliminary assessment for directing further studies

Page 26, Section 4.0 A brief data evaluation section should be added at the beginning of this section. This section should also include a tabular presentation that demonstrates the historical data's inadequacy for a quantitative risk assessment For example, the table should list the various studies and show the differing or unknown analytical methods, the differing or questionable detection limits, the differing analytical laboratories, and the quality assurance procedures. Section 4 4 can provide the basis for this section. Placing a data evaluation section at the beginning of the risk evaluation section would provide justification for the assertion that the historical data are inadequate for a quantitative risk assessment and validate the qualitative approach used. A systematic tabulation of the data's inadequacies will provide the basis for the justification.

Page 26, Section 4 0 Section 4.0 of the report should be re-organized to reflect the four discrete steps in risk assessment hazard identification, exposure assessment, toxicity assessment, and risk characterization. The way section 4.0 is currently organized appears to be illogical

Page 26, third paragraph. The third line in this paragraph states, "Media specific analyses of other radionuclides present at the RFP, such as americium 241, have not been performed for these sites " This sentence contradicts the information presented in section 3. The 1974 Battelle study of both Great Western Reservoir and Standley Lake indicated the presence of americium and cesium 137. This paragraph needs to be corrected to acknowledge those results

Page 27, Section 4.1, Conceptual Approach: The last two sentences in the first paragraph of this section should be deleted Although there are controls on the discharge from the A, B, and C series ponds, the deposition to sites 200-202 from air emissions has not been demonstrably eliminated. Also, these statements are extraneous to the analysis.

Page 27, first paragraph EPA does not agree with the internal hazard ratio for plutonium and americium, at least based on ingestion Depending on which f_1 is used, the ratio is more on the order of 10 1 or 100 1 Moreover, a 40% contribution to overall risk as indicated in this paragraph is generally considered significant in CERCLA assessments

Page 29, Section 4 2, Potential ARARs The applicable or relevant and appropriate requirements (ARARs) mentioned in this section should be organized in a table which may be referenced as needed

Page 29, Section 4 2, Potential ARARs The standards for plutonium activity and total alpha activity are provided However, the total alpha activity (which would include radium-226) that has been detected is not given The historical data should be presented as discussed in previous comments Based on the information in the reports, the reader should be able to independently evaluate the contribution of plutonium to the total alpha activity in the reservoirs The information in the report should also allow the reader to reach the same ultimate conclusions as those provided

Page 30 An exposure assessment needs to be completed before a toxicity assessment A discussion of the exposed populations and the types of land use scenarios that are considered in this risk assessment (whether qualitatively or quantitatively) should be included Only after such an assessment can the appropriate exposure pathways be identified

Page 30, Section 4 3, Toxicity Assessment The toxicity assessment is inadequate There is no mention of the basic indicators of toxicity such as the weight of evidence, the cancer potency slope factors, reference doses, or discussions on what studies these factors are based on This information is available in the Health Effects Assessment Summary Tables published quarterly by EPA and should be included in the toxicity assessment Also, Section 7 7 on page 7-20 of the Risk Assessment Guidance for Superfund, Volume I, contains explicit guidance on summarization and presentation of toxicity information in a risk assessment The toxicity assessment should include information on americium as well as plutonium since other sections of the report indicate that americium may contribute 40% of the total site risk

Page 30, Section 4 2 The water and air monitoring data mentioned briefly in this section should be summarized in a table (average plus or minus one standard deviation, maximum, and minimum for some representative time period) and moved to the section on historical data There should also be a discussion of how well the data represent a reasonable estimate of air

emissions from the reservoirs. These data are mentioned but not used in the evaluation, consequently, the reason the data are not used and the way they compare quantitatively with the standards should be discussed.

Page 30, Section 4.2 The assumption that the plutonium present is Class Y and that it is unlikely to exist in any form other than a plutonium dioxide in "a reducing environment" is never justified Also, the same assumption is used for the plutonium in the soils of SWMU 199 which is not necessarily a reducing environment, particularly at the surface Either the assumption should be justified in both analyses or characterization of the present form of plutonium should be added as a data need

Page 31, Last Paragraph: The statement that "the low levels of internal exposure that workers and the public could potentially receive from sites 200-202...can cause genetic and somatic .effects .." is supported by a reference that does not appear in the bibliography. Also, the "low levels" referred to are undefined because no doses have been calculated. This discussion should be rewritten with evidence and references included Precise language and adequate references are necessary for any discussion regarding health effects resulting from low level exposure to toxic or radioactive compounds. These are essential because these health effects are often very difficult to prove

Page 31, Section 4.2 The internal radiation hazard from ingestion of plutonium and americium should be discussed.

Page 32, Section 4 5, Exposure Pathways: The discussion on release mechanisms, transport media, and receiving media is confusing For example, surface runoff and biotic uptake are described as transport media when in fact these are release mechanisms and recreational use is described as a release mechanism when in fact it is a land use which will define activities leading to potential exposure. Refer to chapter 6 of the Risk Assessment Guidance for Superfund, Volume I, for guidance on the correct use of these terms. The final report must reflect a consideration of the contamination source, the release mechanisms, transport media, and receiving media.

Page 32, Section 4 5: Exposure pathways are discussed without identification of potential receptors Section 4.9 is placed after the risk characterization section. Section 4.9 should be moved to precede the discussion of pathways. It should also be slightly expanded to include a brief description of nearby farms, towns, parks, and wilderness areas, the types of populations which may be receptors, and the types of activities these receptors may be engaged in. Also, an evaluation of potential future land use should be included Different receptors and

potential pathways may result from changes in land use Potential receptors should be identified and described before the exposure pathways to those receptors are discussed This should be done prior to the evaluation of the applicability of pathways

Page 33, Section 4 5 2, Identification of Transport Media The statement that the only primary transport media for plutonium is the contaminated sediments is not accurate The sediments in sites 200-202 are the current source of contamination, and surface water, biota, and air are transport media into which contamination can potentially be released The receiving media which must be considered include surface water, biota, soil, air, and groundwater EPA recommends substantial revisions to Figure 3-1 to reflect an accurate description of the potential releases of the sediment contamination

Page 35, Section 4 5 2 2, Plutonium Uptake in the Food Chain This section of the report presents information on the relevant parameters to be considered in evaluating the potential for uptake in the food chain but fails to make any conclusion about the exposure pathways which will be considered in the risk assessment The report would be greatly improved by drawing some conclusion about the significance of this pathway and how it is considered in the risk assessment The use or potential use of the reservoirs for sport fishing requires a consideration of the benthos to fish to human exposure pathway This pathway can not be discounted based on the information given in this section of the report

Page 35, third paragraph The statement, "The effect of this conservative assumption is that the characterization of risk resulting from this assumption will be overstated " is more appropriate in a discussion of uncertainty

Page 36, Section 4 5 2 2 The statements made in the first paragraph regarding the low solubility and low mobility of plutonium in the physical and biological environments should be referenced

Page 36, Section 4 5 2 2 The first two sentences in the second full paragraph, which are a generic description of aquatic nutrient cycling, appear unrelated to the last statement regarding the K_{OW} of plutonium and uptake of plutonium by terrestrial plants The purpose of this discussion should be clarified or eliminated A reference should be provided and a value presented for the extremely low K_{OW} of plutonium The statement regarding the low K_{OW} of plutonium should be moved to the paragraph where this parameter and its relationship to food chain transfer are discussed

Page 36, second paragraph Is K_{OW} a good indication of

potential uptake for inorganic compounds, especially plutonium? Cite references which support this Otherwise, the text may need to be revised

Page 36, third paragraph The value for K_{ow} is described as "extremely low" and the root uptake of plutonium is described as "negligible" without a value for these parameters given to support this conclusion. The final report should list the parameter values from the cited reference in order to support these statements.

Page 37, Section 4.5 2 2· The paragraphs concerning foliar deposition of radionuclides are not linked to site conditions such as use of reservoir water for food crop irrigation There is no discussion of the relationship between the factors presented and the conditions at SWMUs 200 through 202. Consequently, it is not clear what the discussion of foliar deposition is meant to contribute to the analysis.

Page 37, Section 4.5.2.3. Some migration of plutonium from SWMU 199 to the reservoirs under consideration may be occurring as a result of erosion processes, according to Section 3.4 of the report on SWMU 199 (DOE, 1990b). Include a discussion of this migration in the Historical Information and Preliminary Health Risk Assessment report

Page 37, Section 4.5 2 3: Provide a reference and present values for the " .very low to undetectable concentrations of plutonium..." in Great Western Reservoir and Standley Lake. Also provide a reference and values for the statement that public water supply concentrations have always been below EPA standards

Page 37, Section 4 5 2.3, Surface Water. The sentence beginning, "This scenario has a low probability of occurrence ." can be supported by adding information about the sediment depth interval where plutonium was detected and the concentrations of plutonium which were detected. With this information, the reader can judge the validity of the conclusion.

Pages 38 and 39, Sections 4.5.2 4 and 4.5.3 1: According to the SWMU 199 report, plutonium has been detected in one ground water well (page 38; DOE, 1990b) Therefore the cause of this contamination must be evaluated to determine the potential for plutonium migration to ground water from sites 199 through 202 The statement that "in no case has the plutonium impacted ground water" (page 39; DOE, 1990a) must also be eliminated.

Page 38, Section 4 5.3, Potential Exposure Pathways at Sites 200-202 The exposure scenario that will be considered in the risk assessment is mentioned in this section but is not defined The scenario must be defined completely, including identification of the exposed populations, land use, and duration of exposures

Without this definition, the subsequent discussion of pathways is confusing

Page 40, 4 5 3 1 No sampling data or reference is provided to support item 2 concerning the lack of bioaccumulation of plutonium at the sites Correct this deficiency by presenting data summaries in the historical data section and by citing the appropriate references

Page 40, Item #4 The conclusion that plutonium is not readily available for remixing in the reservoir water is not supported by the information in the report The preliminary risk assessment must give full consideration to the potential risks associated with contaminated sediment re-suspension in the reservoir water The draft report appears to be pre-decisional in not considering certain exposure pathways The basis for ignoring certain pathways is not clear and is not supported by the information in the report

Page 40, Section 4 5 3 2, Soil This section is apparently intended to address the potential exposure pathways associated with soil contamination As written, this section is inconclusive The discussion on the distribution coefficient for plutonium indicates that plutonium is immobilized in soil Dermal contact, soil ingestion, and particulate inhalation remain legitimate pathways which need to be examined in a risk assessment

Page 41, Item #5 EPA representatives have seen video tapes of high winds sweeping clouds of dust from exposed near-shore sediments at Standley lake Certainly, the "It is possible" terminology needs to be changed Further, since tremendous quantities of dust have been observed after re-entrainment from sediments, the analysis predicting a crusty plate-like surface may need to be re-thought

Page 43, Section 4 6 1 The discussion of plutonium's biological half life is confusing It is unclear what the values presented in parentheses represent This discussion should be clarified

Page 44, Section 4 6 2, Ingestion Provide a page number in the cited reference for the assumption that Class Y plutonium is the class of plutonium found at the sites The rationale for this assumption is not clear as the draft document is currently written

Page 44, Section 4 6 2, Ingestion The EPA value for F_1 is 1 x 10^{-4} for plutonium (EPA, 1990) not 1 x 10^{-5}, which is used here There have been some differences of opinion between EPA and ICRP on the value for this parameter EPA is investigating these differences The authors may wish to carry out their own investigation

Page 44, Section 4.6.2, Ingestion The reference used to support the statement that the chemical form of plutonium at the sites is insoluble is not site-specific More justification or explanation of this assumption is required.

Page 44, Section 4.6.3, Dermal Contact. It is not clear that it is "highly unlikely" that the concentrations of soluble plutonium at sites 200-202 are sufficiently high to lead to transfer into a biological system through an open wound Provide information about how high concentrations would have to be in order for this transfer to occur Also, refer to the existing data to support this claim.

Page 46, Section 4.7 2, Physical Model· The last statement on the page requires references and justification. When considering ingestion doses, the residence time of plutonium in the lung seems irrelevant, regardless of whether or not gut residence time is negligible compared to lung residence time

Page 47, Section 4 7.3, Risk From All Modes of Exposure. Because no dose equivalent has been calculated, it is inappropriate to state that the dose equivalent is negligible. Data should be tabulated and presented as discussed in previous comments so the data can be compared with the unit risks presented, along with the appropriate caveats concerning data quality. Major assumptions should be justified with references and a clear rationale. If this is done, a conclusion that the risk associated with the contaminated reservoirs is most likely low to negligible would be better supported.

Page 51, Section 4.8.1.3, Spillway Sediments. In this section and a number of other places in the text, sediment data is compared to the soil activity screening level adopted by CDH This comparison is not appropriate. CDH activity screening level applies to the top 1/8" of soil collected using a specific composite sampling technique The available sediment data was collected using dredge and core sampling techniques and the concentrations were determined on a wet weight basis. For these reasons, the CDH screening level and the analytical results are not comparable and this is certainly not a basis for discounting the exposure pathway of inhalation of fugitive dust from resuspension of reservoir sediments

Page 53, Section 4.8 2.2, Reservoir Sediments . Given available evidence of re-entrainment of sediment particles due to high winds, this pathway appears to be probable rather than "potential".

Page 54, Section 4.8.3 2, Reservoir Sediments: Sediment and water samples were taken from Mower Reservoir by EPA during the 1970 sampling effort. The results of the radionuclide analysis of these samples are available in the EPA report documenting this

sampling activity (EPA, 1971)

Page 55, Section 4 9, Populations at Risk of Exposure The fact that the assessment is qualitative does not preclude an adequate description of potential receptors

Page 56, Section 4 10, Uncertainties in the Risk Evaluation The statement that, "toxicological data errors are probably the largest source of uncertainty " implies that the data are incorrect The statement should be reworded The author probably means that extrapolating the data to different species and doses is highly uncertain The statement is misleading

Page 59, Section 5 0, Conclusions and Recommendations The sediment to benthos to fish to humans pathway could be credible particularly for Standley Lake This pathway needs to be analyzed further The basis for discounting it in this report is not clear

Tables Table 4 1 will need to be re-worked as the conceptual model is changed to more accurately reflect the release and transport mechanisms, and receiving media The information in Table 4 2 should be brought into the text more often in order to put the report in perspective Table 4 2 can be used to help identify data needs (e g , the particle size issue is given a high rating for its potential impact on risk and yet is included as just another parameter to be measured) Specific mention of Am, which may contribute moderately to uncertainty, is not made, but measurements of the organic content of sediments is mentioned and this is not even provided as a source of uncertainty in the table The identification of data gaps is clearly one of the most important aspects of risk assessment when there are significant problems with the environmental data Also, the criteria used to make the assignments of relative uncertainty should be provided

REFERENCES

Battelle, 1974, Battelle Northwest Laboratories, "Radionuclide Concentrations in Reservoirs, Streams, and Domestic Waters Near the Rocky Flats Installation", 1974.

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DOE, 1990b, U S Department of Energy, Final Draft Remedy Report, Operable Unit 3 - SWMU 199, U.S Department of Energy, Rocky Flats Plant, Environmental Restoration Program, Golden, Colorado, October 24, 1990.

EPA, 1973, U S Environmental Protection Agency, Radioactivity Levels in the Environs of the Rocky Flats Plutonium Plant, Colorado U S. EPA , Region VIII, Technical Investigations Branch, Surveillance and Analysis Division, Part I, December 15, 1973

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EPA, 1990a, U S Environmental Protection Agency, Health Effects Assessment Summary Tables Fourth Quarter FY-90. OERR 9200 6-303 (90-4), September 1990

EPA, 1990b, U S Environmental Protection Agency, Guidance for Data Useability in Risk Assessment, Interim Final. U S Environmental Protection Agency/540/G-90/008, October 1990

Penrose, W , W Polzer, E Essington, D Nelson, and K Orlandini, 1990, Mobility of Plutonium and Americium through a Shallow Aquifer in a Semiarid Region Environmental Science Technology, Vol 24, pp. 228-234, 1990